DATA MODUL
DISPLAYS AND EMBEDDED SOLUTIONS

Specification

G057QN01 V2 incl. Touch - 4W

Content:

Mechanical Drawing

Appendix A: Specification of TFT G057QN01 V2

Appendix B: Specification of Touch TP-3324S1F0

Please be aware that some of the values e.g. optical, mechanical etc. of the complete unit (assembled display plus touch panel) might differ from the original values of the individual components.

Version: March 2013

Note: This specification is subject to change without prior notice

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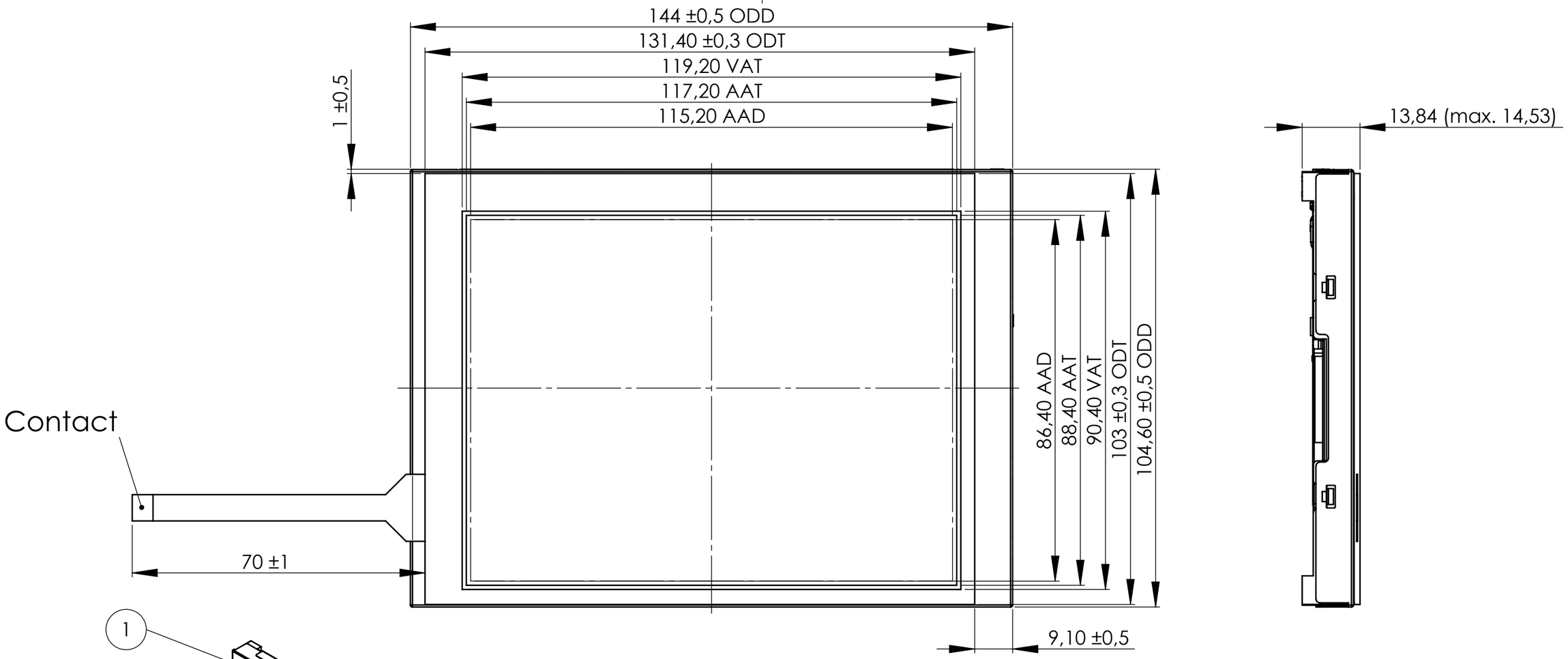

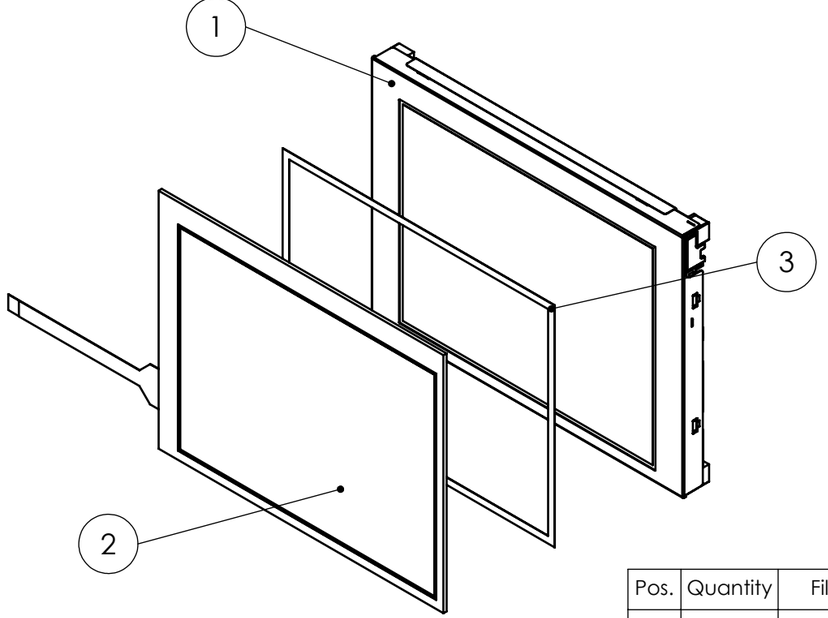

M 1:2

Pos.	Quantity	File Number	Description
1	1	1009879-T	TFT-LCD MODULE 5,7"
2	1	1009863-T	Touch
3	1	1009937-T	Klebeband 3x0,13

ODD	Outline Dimension Display
ODT	Outline Dimension Touch
VAT	Viewing Area Touch
AAT	Active Area Touch
AAD	Active Area Display

This drawing is only schematic representation of the structure.
The parts to be used are defined in the ProAlpha parts list.

REV.	NO. OF CHANGES	REL.DATE	DRAWN BY	E.C.-NO.	MODIFICATION/DESCRIPTION
000		26.02.2013	Aschenbrenner	10000	Neuanlage

FINISH

CONRAC D-97990 Weikersheim

DATA MODUL D-80687 München

RELEASED: ja

PROJECT: DMO_C_

MATERIAL

DRAWING TITLE

Assembly

TFT Display 5,7" + resistive Touch

TOLERANCES DIN ISO 2768-mK

SURFACES DIN ISO 1302

DRAWING/PART NUMBER

12002650 000

FILE NUMBER: 1009936

SCALE 1:1

SIZE ISO A3

☐ **Preliminary Specification**
■ **Final Specification**

Module	**5.7 Inch Color TFT-LCD**
Model Name	**G057QN01 V2**

Customer	**Date**	**Approved by**	**Date**
		Debbie Chiu	2011/10/21
Checked & Approved by		**Prepared by**	
		Daniel PY Tsai	2011/10/21
Note: This Specification is subject to change without notice.		General Display Business Division / AU Optronics corporation	

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Record of Revision

Version and Date	Page	Old description	New Description	Remark
0.1, March.28.2011	All	First edition preliminary specifications		
0.2, March.31.2011	20		Correct Mechanical Characteristics Diagram	
	5	Typical Power Consumption = TBD Weight = TBD	Typical Power Consumption = 3.34 W (LCD:0.46 W/LED BLU: 2.88W) @ All black pattern, Full Load and V_{LED}=12V Weight = 150g (typ.), 165g (max.)	
	6	Color / Chromaticity Coordinates =TBD	Update Chromaticity Coordinates	
	10	VDD Power = TBD	VDD Power = Typ. 0.46 w Max. 0.51 w	
	11	Input Current = TBD Power Consumption = TBD	Input Current = 0.24 A Power Consumption = 2.88 w	
	18 20	7.3 PIN 1 definition of CN1 and CN2 9. Mechanical Characteristics	Update 2D drawing	
	11 15 19 20	Parameter guideline for LED Timing Characteristics Connector & Pin Assignment Connector & Pin Assignment	Add LED backlight parameter Add Setup & Hold Time Add LED Light Bar Input (CN3) Add PIN 1 definition of CN3	
1.1 Nov.22, 2011	21	Assembly Module Drawing	Add CN2 coordinate	

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1. Operating Precautions

1) Display area (Polarizer) of TFT-LCD Module is easily to be damaged, please be cautious and not to scratch it.
2) Be sure to power off your machine before connecting or disconnecting your signal cable to TFT-LCD Module.
3) Wipe off water drop on display area immediately. Long contact with water may cause discoloration or spots.
4) When the panel surface is soiled, wipe it with absorbent cotton or soft cloth.
5) Display area (Glass) of TFT-LCD Module may be broken or cracked if bump Module against hard object.
6) To avoid ESD (Electro Static Discharde) damage, be sure to ground yourself before handling TFT-LCD Module.
7) Do not open nor modify the TFT-LCD module assembly.
8) Do not press the reflector sheet at the back of the module to any direction.
9) In case if TFT-LCD module has to be put back into the packing container slot after it was taken out from the container, do not press the center of the LED Reflector edge. Instead, press at the far ends of the LED Reflector edge softly. Otherwise the TFT-LCD Module may be damaged.
10) When inserting or removing of your signal cable to TFT-LCD Module, be sure not to apply abnormal force (rotate, tilt…etc.) to the Connector of the TFT-LCD Module.
11) TFT-LCD Module is not allowed to be twisted & bent even force is added on module in a very short time. Please design your display product well to avoid external force applying to module by end-user directly.
12) Small amount of materials without flammability grade are used in the TFT-LCD module. The TFT-LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950 or UL1950), or be applied exemption.
13) Severe temperature condition may result in different luminance, response time.
14) Continuous operating TFT-LCD Module under high temperature environment may accelerate LED light bar exhaustion and reduce luminance dramatically.
15) The data on this specification sheet is applicable when TFT-LCD module is placed in landscape position.
16) Continuous displaying fixed pattern may induce image sticking. It's recommended to use screen saver or moving content periodically if fixed pattern is displayed on the screen.

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2. General Description

G057QN01 V2 is designed for industrial display applications with QVGA (320 x RGB x 240) resolution and 262k colors (RGB 6-bits). It is composed of a TFT-LCD panel, driver ICs, control and power supply circuits board and backlight unit including LED driver circuit. G057QN01 V2 offers CMOS interface for display signal input.

2.1 Display Characteristics

The following items are G057QN01 V2 characteristics summary at 25 □(Room Temperature).

Items	Unit	Specifications
Screen Diagonal	inch	5.7
Active Area	mm	115.2(H) x 86.4(V)
Pixels H x V		320 x 3(RGB) x 240
Pixel Pitch	mm	0.36 x 0.36
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN, Normally White
Nominal Input Voltage VDD	Volt	3.3 typ.
Typical Power Consumption	Watt	3.34 W (LCD:0.46 W/LED BLU: 2.88W) @ All black pattern, Full Load and V_{LED}=12V
Weight	Grams	150g (typ.), 165g (max.)
Physical Size	mm	144.0(H)x 104.6(V) x 12.3(D) (typ.)
Electrical Interface		CMOS 6-bit Parallel RGB
Surface Treatment		Anti-Glare, Hardness 3H
Support Color		262K colors
The most suitable view angle		12 o'clock
Temperature Range Operating Storage (Non-Operating)	 °C °C	 -30 to +85 -30 to +85
RoHS Compliance		RoHS Compliance

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2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25□ (Room Temperature).

Item	Unit	Conditions	Min.	Typ.	Max.	Remark
White Luminance	cd/m2	V_{LED} =12V, D_{PWM} =100% (center point)	600	800	-	Note 1
Uniformity	%	5 Points		-	1.3	Note 1, 2, 3
Contrast Ratio			500	800	-	Note 4
Response Time	msec	Rising	-	15	20	Note 5
	msec	Falling	-	10	15	
	msec	Rising + Falling	-	25	35	
Viewing Angle	degree degree	Horizontal (Right) CR = 10 (Left)	70 70	80 80	- -	Note 6
	degree degree	Vertical (Upper) CR = 10 (Lower)	60 60	70 70	- -	
Color / Chromaticity Coordinates (CIE 1931)		White x	0.263	0.313	0.363	
		White y	0.279	0.329	0.379	
		Red x	0.506	0.556	0.606	
		Red y	0.265	0.315	0.365	
		Green x	0.281	0.331	0.381	
		Green y	0.546	0.596	0.646	
		Blue x	0.106	0.156	0.206	
		Blue y	0.070	0.120	0.170	
Color Gamut	%		-	50	-	

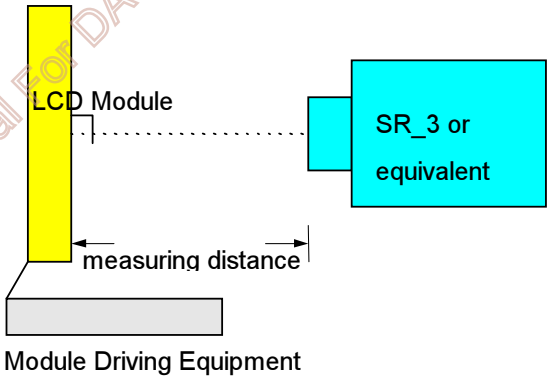
Note 1: Measurement method

Equipment Pattern Generator, Power Supply, Digital Voltmeter, Luminance meter (SR_3 or equivalent)

Aperture 1□with 50cm viewing distance

Test Point Center

Environment < *1 lux*



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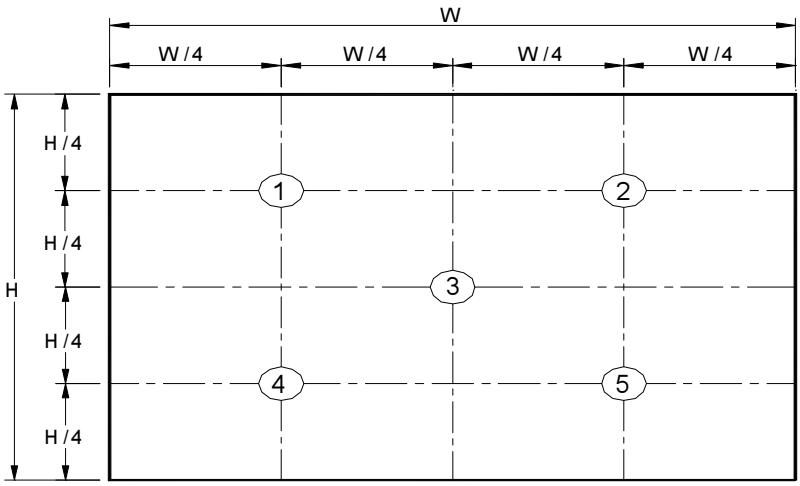
Note 2: Definition of 5 points position (Display active area: 115.2mm(W) x 86.4mm(H))



Note 3:
The luminance uniformity of 5 points is defined by dividing the maximum luminance value by the minimum luminance value at full white condition.

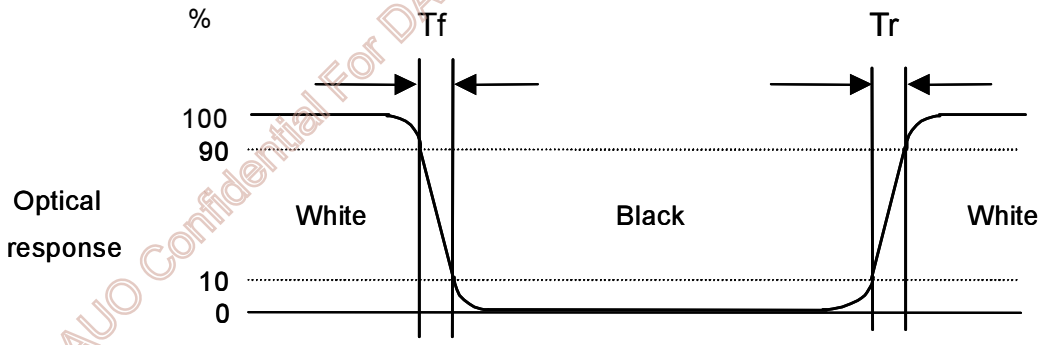
$$\delta_{W5} = \frac{\text{Maximum Brightness of five points}}{\text{Minimum Brightness of five points}}$$

Note 4: Definition of contrast ratio (CR):

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness @ “White” state}}{\text{Brightness @ “Black” state}}$$

Note 5: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “White” to “Black” (falling time) and from “Black” to “White” (rising time), respectively. The response time interval definition is between 10% and 90% of amplitude. Please refer to the figure as below.



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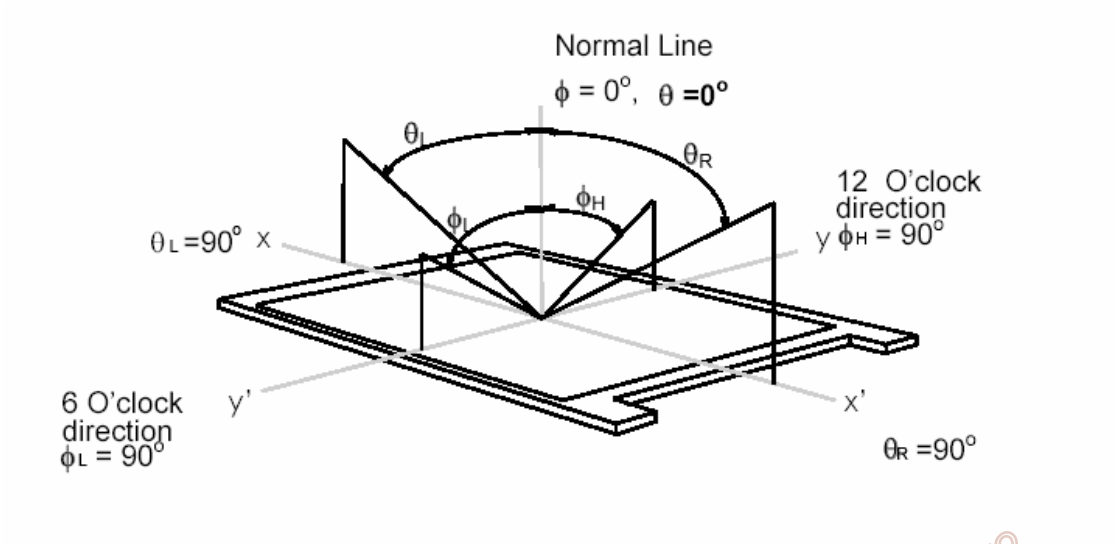
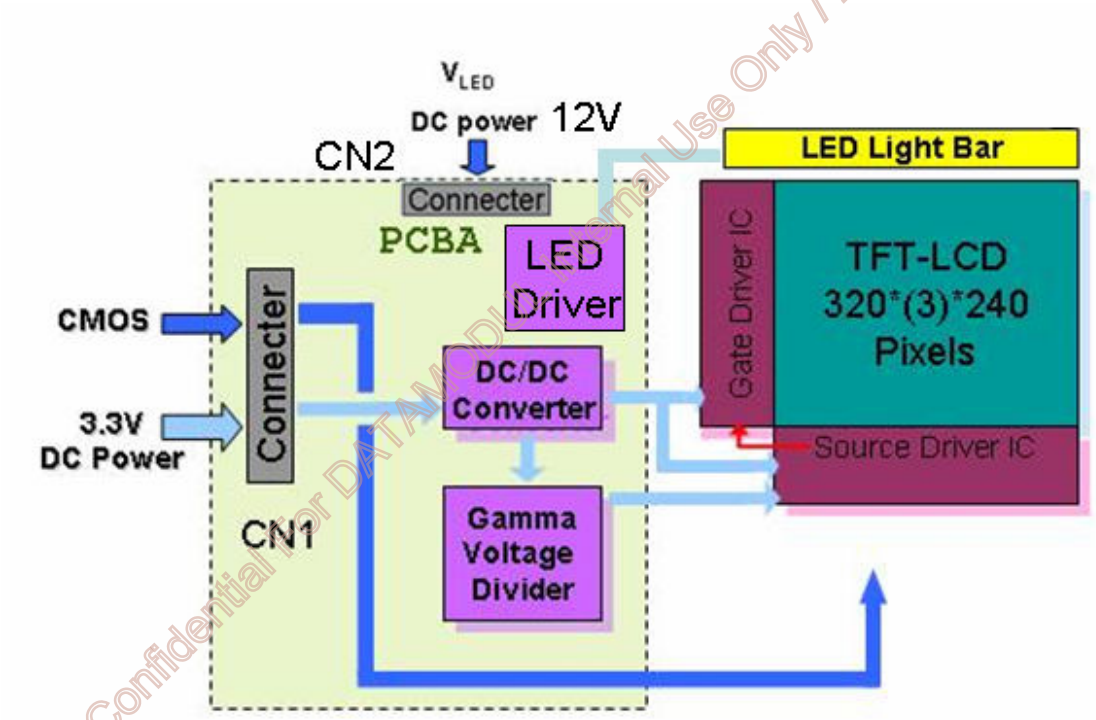
Note 6: Definition of viewing angle

Viewing angle is the measurement of contrast ratio □10, at the screen center, over 180° horizontal and 180° vertical range. The 180° horizontal (θ_L, θ_R) and 180° vertical (Φ_H, Φ_L) range are illustrated as following figure.



3. Functional Block Diagram

The following diagram shows the functional block of the G057QN01 V2 color TFT/LCD module.



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4. Absolute Maximum Ratings

4.1 Absolute Ratings

Item	Symbo	Min	Max	Unit	Remark
Logic/LCD Drive Voltage	VDD	-0.3	+3.6	Volt	Ta= 25°C
LCD Input Signal Voltage	VIN	-0.3	+3.6	Volt	Ta= 25°C
LED BLU Drive Voltage	V_{LED}	0	23	Volt	Ta= 25°C
LED Dimming Input Voltage	V_{PWM}	0	8	Volt	Ta= 25°C

4.2 Absolute Ratings of Environment

Item	Symbol	Min	Max	Unit	Remark
Operating Temperature	TOP	-30	+85	℃	Note 1, 2
Operation Humidity	HOP	5	95	%RH	Note 1, 2
Storage Temperature	TST	-30	+85	℃	Note 1
Storage Humidity	HST	5	95	%RH	Note 1

Note 1: Maximum Wet-Bulb should be 39□ and no condensation.

Note 2: Only operation is guaranteed. Optical performance should be evaluated at 25□ only.

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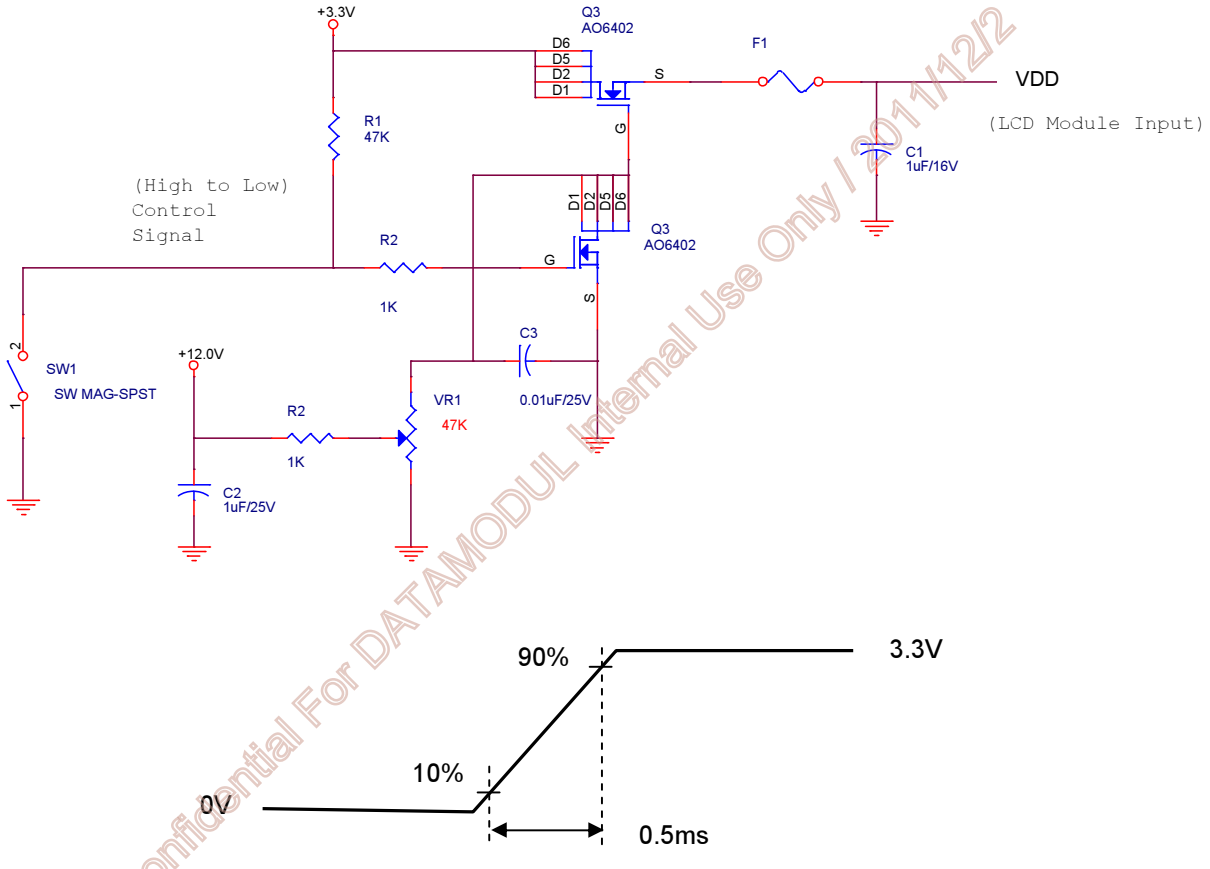
5. Electrical Characteristics

5.1 TFT-LCD Driving

5.1.1 Power Specification

Symbol	Parameter	Min	Typ	Max	Units	Remark
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	Volt	
IDD	VDD Current	-	115	130	mA	All Black Pattern (VDD=3.3V, at 60Hz)
Irush	LCD Inrush Current	-	-	1.5	A	Note 1
PDD	VDD Power	-	0.46	0.51	Watt	All Black Pattern (VDD=3.3V, at 60Hz)
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	100	mVp-p	All Black Pattern (VDD=3.3V, at 60Hz)

Note 1: Measurement condition:



VDD rising time

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5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when VDD is off.

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remarks
Logic Input Voltage for Display Signals	High	VIH	0.7VDD	-	VDD	Volt	
	Low	VIL	0	-	0.3VDD	Volt	
Input Voltage for RL/UD	High	VIH	0.7VDD	-	VDD	Volt	
	Low	VIL	0	-	0.3VDD	Volt	

5.2 Backlight Unit Driving

5.2.1 Parameter guideline for LED

Following characteristics are measured under stable condition at 25□ (Room Temperature).

Symbol	Parameter	Min	Typ	Max	Units	Remark
V_{LED}	Input Voltage	9	12	20	Volt	
I_{LED}	Input Current	-	0.24		A	V_{LED} =12V, D_{PWM} =100%
P_{LED}	Power Consumption	-	2.88		W	V_{LED} =12V, D_{PWM} =100%
$Irush_{LED}$	Inrush Current	-		1.5	A	V_{LED} =12V, D_{PWM} =100%
$V_{PWM\ DIM}$	Dimming control Voltage High	2.0	3.3	5.5	Volt	Note 1,2
	Dimming control Voltage Low	-	-	0.2	Volt	
F_{PWM}	Dimming Frequency	200		30K	Hz	
D_{PWM}	Dimming duty cycle	1		100	%	
$V_{LED\ On/Off}$	On Control Voltage	2	3.3	5.5	Volt	Note 3, 4
	Off Control Voltage	-	-	0.8	Volt	
I_F	LED Forward Current		33.3	35.0	mA	Ta = 25oC
V_F	LED Forward Voltage		27.2			IF = 33.3mA, Ta = -30oC
			25.6	29.2		IF = 33.3mA, Ta = 25oC
			24.8			IF = 33.3mA, Ta = 85oC
P_{LED}	LED Power		2.56	2.88		
Operating Life		50000	-	-	Hrs	Note 5, 6

Note 1: PWM dimming function can be operated by PWM signal. PWM duty cycle can adjust white Luminance. (PWM High: ON and PWM Low: OFF)

Note 2: PWM signal can not be floating and pull-down to ground when waiting.

Note 3: Enable ($V_{LED\ On/Off}$) must be turned on late than V_{LED} and PWM Signal.

Note 4: Enable ($V_{LED\ On/Off}$) must be turned off early than V_{LED} and PWM Signal.

Note 5: If G057QN01 V2 module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

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Note 6: Operating life means brightness goes down to 50% initial brightness. Minimum operating life time is estimated data.

Note 7: See Section 6.6 for LED Backlight Unit Interface Signal Description

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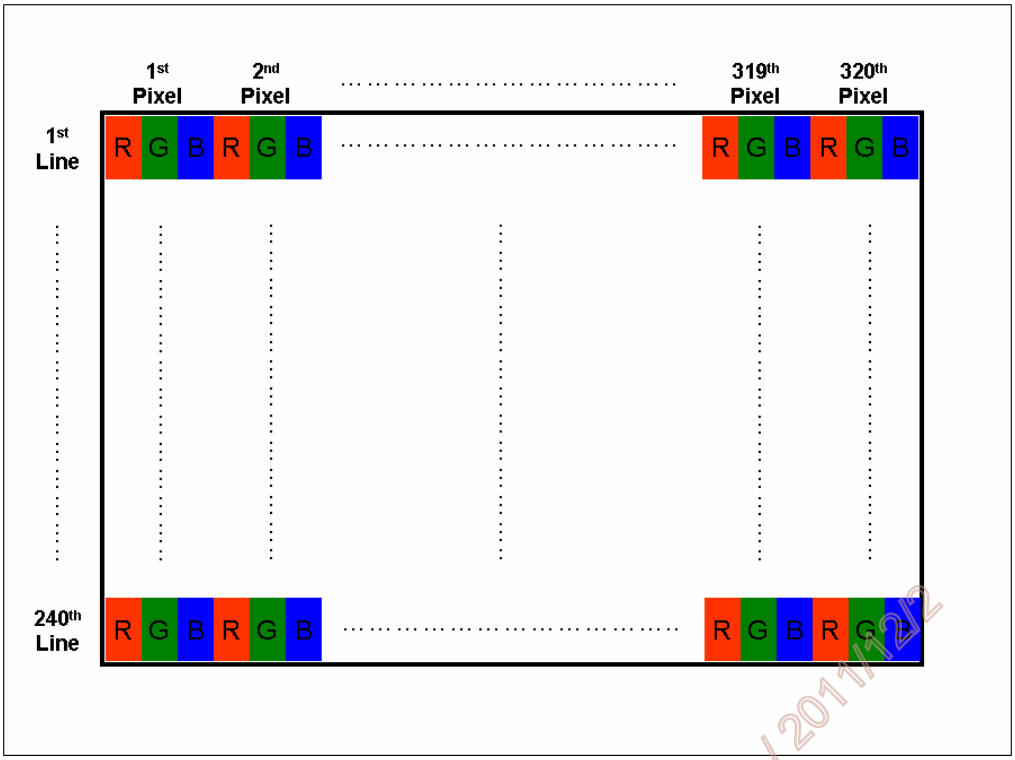
6. Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship between input signal and LCD pixel format.



6.2 Scanning Direction

The following figures show the image seen from the front view. The arrow indicates the direction of scan.

R/L=Low or NC; U/D=High or NC

R/L=High; U/D=High or NC

R/L=Low or NC; U/D=Low

R/L=High; U/D=Low

Note 1: TFT-LCD interface signal description is shown in section 6.4.

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6.3 The Input Data Format

This product displays 262,144 colors in terms of the 64 grey levels on RGB respectively. The following table demonstrates the display of input data.

Display colors		Data signal (0 : Low level, 1: High level)																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red grayscale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Dark	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	↑ ↓ bright																		
		1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
		1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green grayscale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Dark	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	↑ ↓ bright																		
		0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
		0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue grayscale	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	↑ ↓ bright																		
		0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
		0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

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6.4 TFT- LCD Interface Signal Description

PIN No.	Symbol	Pin Description
1	GND	Ground
2	DOTCLK	Dot clock
3	NC	NC
4	NC	NC
5	GND	Ground
6	R0	Red data (LSB)
7	R1	Red data
8	R2	Red data
9	R3	Red data
10	R4	Red data
11	R5	Red data (MSB)
12	GND	Ground
13	G0	Green data (LSB)
14	G1	Green data
15	G2	Green data
16	G3	Green data
17	G4	Green data
18	G5	Green data (MSB)
19	GND	Ground
20	B0	Blue data (LSB)
21	B1	Blue data
22	B2	Blue data
23	B3	Blue data
24	B4	Blue data
25	B5	Blue data (MSB)
26	GND	Ground
27	DE	Data Enable Signal
28	VDD	Power supply (3.3V Typ. ONLY)
29	VDD	Power supply (3.3V Typ. ONLY)
30	R/L	Horizontal reverse scan (Low or NC → Normal; High → Right & Left Reverse Scan)
31	U/D	Vertical reverse scan (High or NC → Normal; Low → Up & Down Reverse Scan)
32	NC	NC
33	GND	Ground

Note 1: “Low” stands for 0V. “High” stands for 3.3V. “NC” stands for ”No Connection”.

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6.5 TFT- LCD Interface Timing

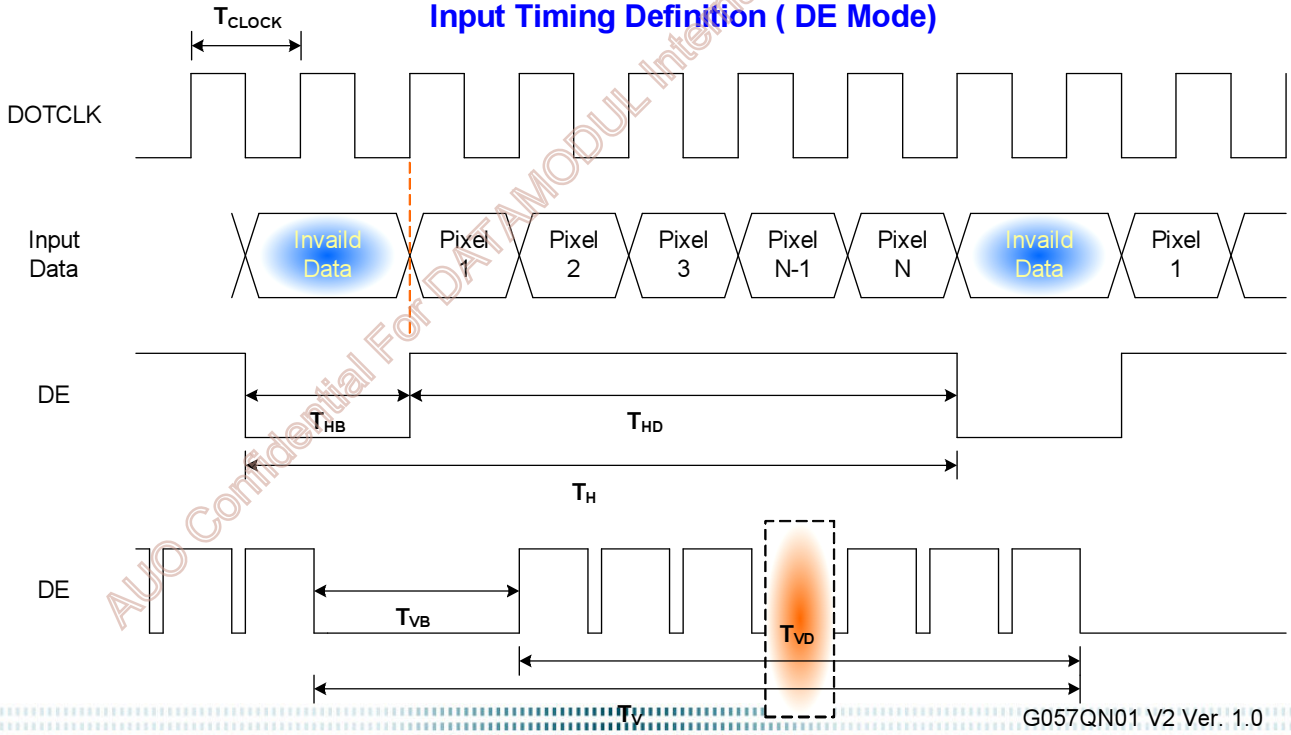
6.5.1 Timing Characteristics

DE mode only

Signal		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency (DOTCLK)		1/ T_{CLOCK}	6.2	6.4	12.1	MHz	Note1
Data	Setup Time	Tdsu	8			ns	RL,GL,BL to DCLK
	Hold Time	Tdhd	8			ns	
DE	Setup Time	Tesu	8			ns	
Horizontal Section	Period	T_H	406	408	560	T_{CLOCK}	Note1
	Active	T_{HD}	320				
	Blanking	T_{HB}	86	88	240		
Vertical Section	Period	T_V	254	263	360	T_{LINE}	Note1
	Active	T_{VD}	240				
	Blanking	T_{VB}	14	23	120		

Note 1: Recommended frame rate is 60 Hz.

6.5.2 Input Timing Diagram



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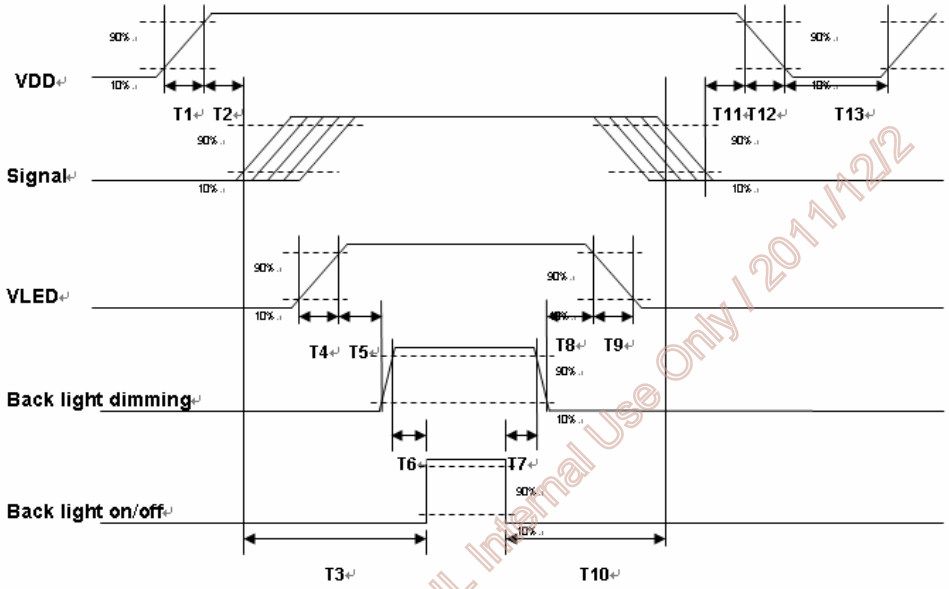
6.6 LED Backlight Unit Interface Signal Description

Pin #	Symbol	Pin Description
1	V_{LED}	12V input
2	V_{LED}	12V input
3	GND	Ground
4	GND	Ground
5	PWM DIM	1~100% PWM dimming
6	LED On/Off	0V-Off; 3.3~5V/NC-On

Note 1: “NC” stands for ”No Connection

6.7 Power ON/OFF Sequence

VDD power, LCD interface signals and backlight on/off sequence are shown in the following chart. Signals from any system shall be Hi-Z state or low level when VDD is off.



Power ON/OFF sequence timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	--	10	[ms]
T2	30	40	50	[ms]
T3	200	--	--	[ms]
T4	0.5	--	10	[ms]
T5	10	--	--	[ms]
T6	10	--	--	[ms]
T7	0	--	--	[ms]
T8	10	--	--	[ms]
T9	--	--	10	[ms]
T10	110	--	--	[ms]
T11	0	16	50	[ms]
T12	--	--	10	[ms]
T13	1000	--	--	[ms]

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ON/OFF sequence should be applied to avoid abnormal function in the display. Please make sure to turn off the power when you plug the cable into the input connector or pull the cable out of the connector.

7. Connector & Pin Assignment

7.1 TFT- LCD Signal (CN1): LCD Connector

Manufacturer	Starconn
Connector Model Number	089H33-000100-G2-R, compatible with IMSA-9637S-33Y902 & ELCO 08-6210--033-340-800+

Pin#	Symbol	Pin#	Symbol	Pin#	Symbol
1	GND	12	GND	23	B3
2	DOTCLK	13	G0	24	B4
3	NC	14	G1	25	B5
4	NC	15	G2	26	GND
5	GND	16	G3	27	DE
6	R0	17	G4	28	VDD
7	R1	18	G5	29	VDD
8	R2	19	GND	30	R/L
9	R3	20	B0	31	U/D
10	R4	21	B1	32	NC
11	R5	22	B2	33	GND

7.2 LED Backlight Unit (CN2): Backlight Connector

Manufacturer	JST
Connector Model Number	SM06B-SRKS-G-TB compatible with JST SM06B-SRSS-TB (LS) (SN)
Mating Connecter Model Number	JST SHR-06V-BKHF-B or compatible

Pin #	Symbol	Pin #	Symbol
1	V_{LED}	4	GND
2	V_{LED}	5	PWM DIM
3	GND	6	LED ON/OFF

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7.3 LED Light Bar Input (CN3): Light Bar Connector

Manufacturer	STM or compatible
Connector Model Number	P24021P6 or compatible
Mating Connecter Model Number	SM06B-SHLS-TF or compatible

Pin #	Symbol	Pin Description	Cable color
1	AN1	Channel 1 LED anode	Red
2	AN2	Channel 2 LED anode	Red
3	AN3	Channel 3 LED anode	Red
4	CA1	Channel 1 LED cathode	White
5	CA2	Channel 2 LED cathode	Blue
6	CA3	Channel 3 LED cathode	Black

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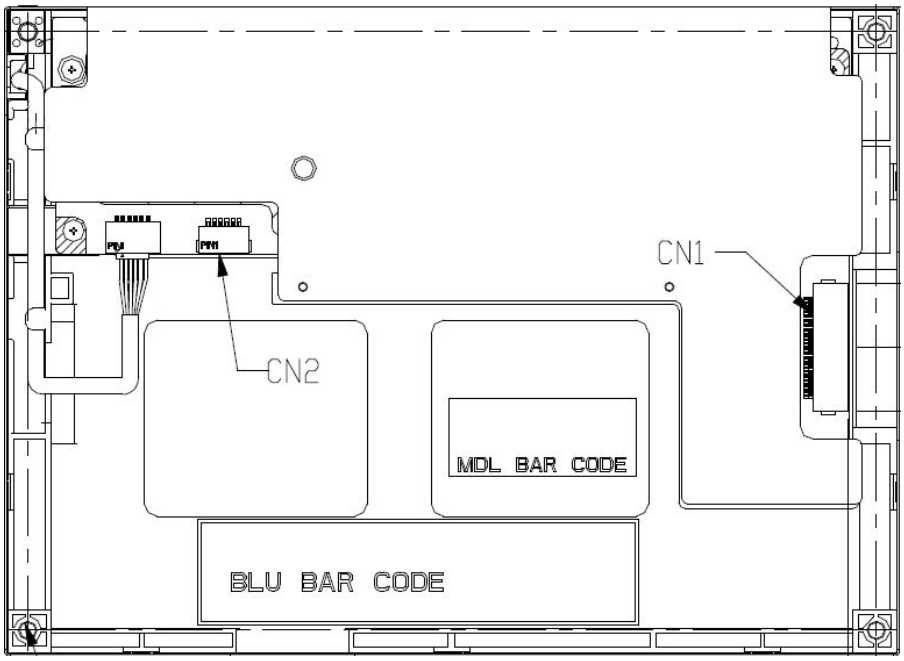
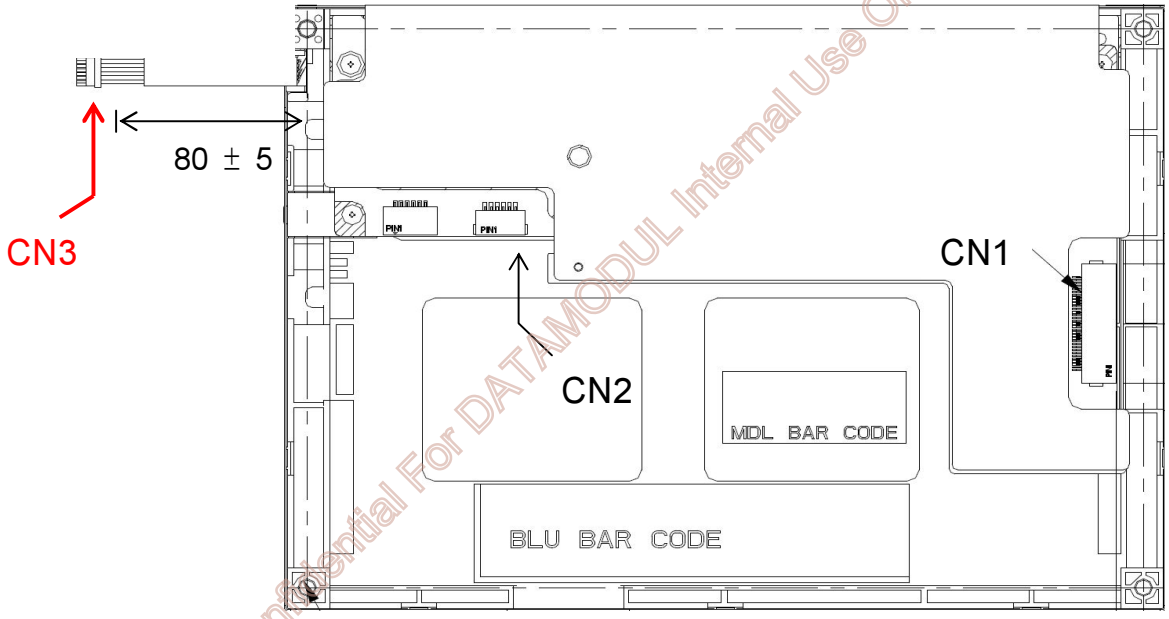
7.4 PIN 1 definition of CN1 and CN2



(Rear side of TFT-LCD)

7.5 PIN 1 definition of CN3



(Rear side of TFT-LCD)

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8. Reliability Test Criteria

Items	Required Condition	Remark
Temperature Humidity Bias	40□/90%,300Hr	Note 2
High Temperature Operation	85□,300Hr	Note 2
Low Temperature Operation	-30□,300Hr	Note 2
High Temperature Storage	85□,300 hours	Note 2
Low Temperature Storage	-30℃,300 hours	Note 2
Thermal Shock Test	-20℃/30 min ,60℃/30 min ,100cycles	Note 2
Hot Start Test	85℃/1 Hr (min.), power on/off per 5 minutes, repeat 5 times	Note 2
Cold Start Test	-30℃/1 Hr (min.), power on/off per 5 minutes, repeat 5 times	Note 2
Shock Test (Non-Operating)	50G,20ms,Half-sine wave, (±X, ±Y, ±Z)	Note 2
Vibration Test (Non-Operating)	1.5G, 10~200~10Hz, Sine wave, 30mins/axis, 3 direction (X, Y, Z)	Note 2
ESD	Contact Discharge: ±8KV, 150pF(330Ω) 1sec, 8 points, 25 times/point Air Discharge: ±15KV, 150pF(330Ω) 1sec, 8 points, 25 times/point	Note 1,2
Attitude Test	Operating: 14,000 ft, Ramp: 2000 ft/min, 8hrs Non-operating: 40,000 ft, Ramp: 2000 ft/min, 24hrs	Note 2

Note1: According to EN61000-4-2 ESD class B criteria, some performance degradation is allowed. TFT-LCD module is self-recoverable, no data lost and no hardware failures after test.

Note2:

- Water condensation is not allowed for each test items.
- Each test is done by new TFT-LCD module. Don't use the same TFT-LCD module repeatedly for reliability test.
- The reliability test is performed only to examine the TFT-LCD module capability.
- To inspect TFT-LCD module after reliability test, please store it at room temperature and room humidity for 24 hours at least in advance.

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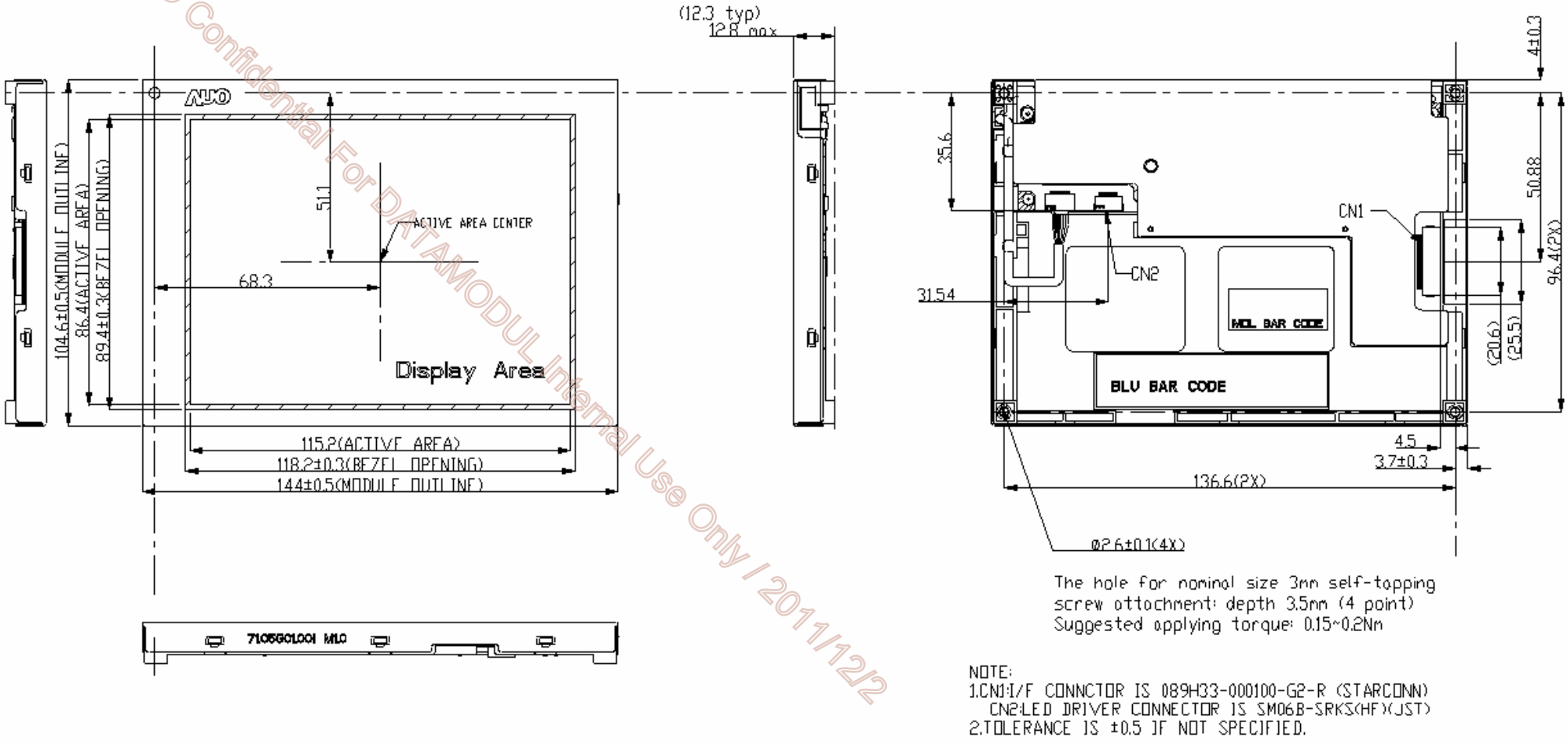
9. Mechanical Characteristics



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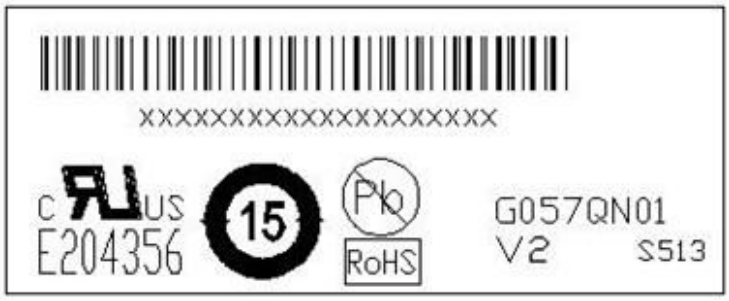
10. Label and Packaging

10.1 Shipping Label (on the rear side of TFT-LCD display)

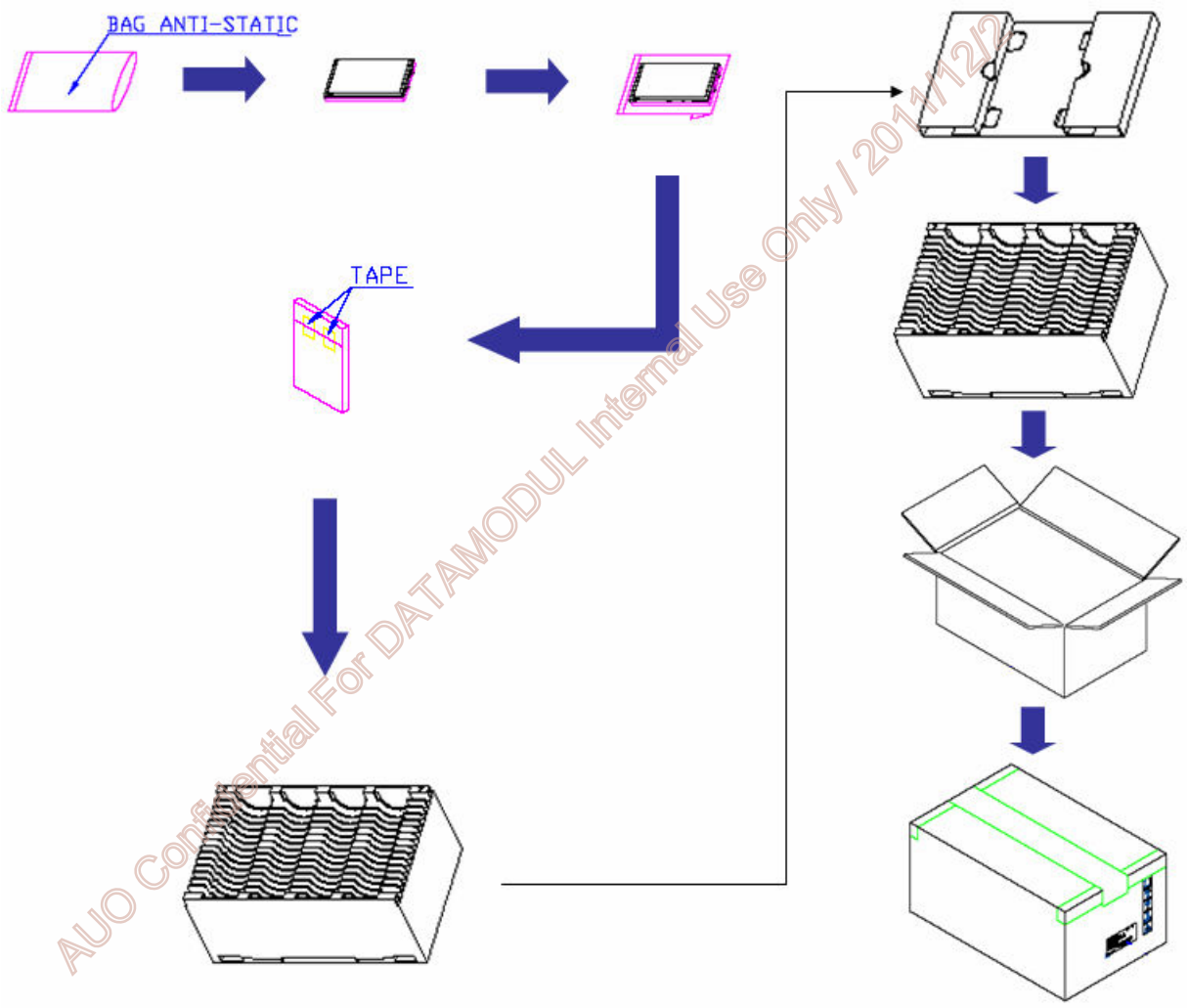


10.2 Carton Package

Max. capacity: 60 pieces TFT-LCD module per carton

Max. weight: 12.95 kg per carton

Outside dimension of carton: 520(L)mm* 340(W)mm* 250(H)mm



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11 Safety

11.1 Keen Edge Requirements

There will be no keen edges or corners on the display assembly that could cause injury.

11.2 Materials

11.2.1 Toxicity

There will be no carcinogenic materials used anywhere in the TFT-LCD module. If toxic materials are used, they will be reviewed and approved by the responsible AUO toxicologist.

11.2.2 Flammability

All components including electrical components that do not meet the flammability grade UL94-V1 in the TFT-LCD Module will complete the flammability rating exception approval process.

The printed circuit board will be made from material rated 94-V1 or better. The actual UL flammability rating will be printed on the printed circuit board.

11.3 Capacitors

If any polarized capacitors are used in the TFT-LCD module, provisions will be made to keep them from being inserted backwards.

11.4 National Test Lab Requirement

The TFT-LCD Module will satisfy all requirements for compliance to UL 60950 (U.S.A. Information Technology Equipment).

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Specification

AST/ATP Series
Revision 11

Version March 23, 2010

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1. Product Specifications

1-1. Product Applicable

§ This specification is applied to the analog resistive touchscreen: ATP/AST Series.

1-2. Structure

§ Dimensions, structure, and shape are referred on the drawing attached.

1-3. Environmental Specifications

Specification	Value
Operating Temperature	-20°C to 70°C (no condensation)
Operating Humidity	-20°C to 60°C Less than 90%RH (no condensation) Exceeding 60°C 133.8g/m^3 (no condensation)
Storage Temperature	-40°C to 80°C (no condensation)
Storage Humidity	-40°C to 60°C Less than 95%RH (no condensation) Exceeding 60°C 142.9g/m^3 (no condensation)
Chemical Resistance (top surface)	Toluene, Tricholoroethylene, Athetone, Alcohol, Gasoline, Machine Oil, Ammonia, Glass Cleaner, Mayonnaise, Ketchup, Wine, Salad Oil, Vinegar, Lipstick, etc.

1-4. Mechanical Characteristics

Specification	Value	
Activation Force	0.05N to 0.8N	
Operating Life	Input (finger)	10,000,000 hits
	Character Input (pen)	100,000 characters
Light Transmittance	Over 80% (typical value at full wavelength)	
Surface Hardness	Over 2H (by JIS pencil hardness)	

1-5. Electrical Characteristics

Specification	Value	
Maximum Voltage	DC6V	
Maximum Current	Top Electrode	100mA
	Bottom Electrode	100mA
	Between the Top and Bottom	0.5mA
Linearity	Under ±2% (Under ±1% (typical value))	
Terminal Resistance	Top Electrode	Less than 1kΩ
	Bottom Electrode	Less than 1kΩ
Insulation Resistance	Neighboring Terminals	Over 20MΩ at 25V
	Active Area Electrodes	Over 20MΩ at 25V
Chattering	Less than 10msec at ON/OFF.	

1-6. Appearance

§ Scratch, dust (W = width, L = length, D = average diameter = (longest + shortest) /2)

Item	Width (mm)	Length (mm)	Acceptable Numbers	Total
Linear(Scratch/Dust) Over 0.1mm in diameter refer to the Circular.	0.1≥W>0.05	4≥L	1pcs in ϕ30mm	Within 5pcs /panel
	0.05≥W>0.03	10≥L	2pcs in ϕ20mm	
	0.03≥W	20≥L	Acceptable	
Circular (Scratch/Dust)	0.4≥D>0.3 *1		1pcs in viewing area *1	
	0.3≥D>0.2		2pcs in ϕ30mm	
	0.2≥D		Acceptable	

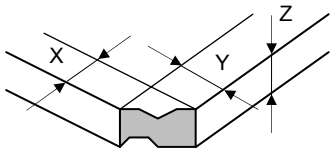
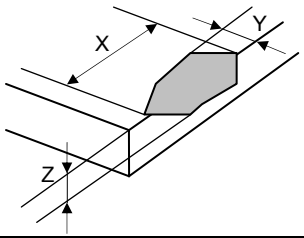
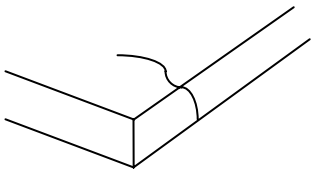
Applied only in the Active Area. Scratches or dusts in the outside of the Active Area are acceptable unless the electrical characteristics are affected.

*1 Applied to the size of 14 inches or more.

§ Dirt

Acceptable if not noticeable on a black mat.

§ Tip, crack (t = glass thickness) (applicable only for the glass)

Item	Size (mm)			Acceptable Numbers
Corner		X	≤3	2pcs /panel
		Y	≤3	
		Z	≤t	
Side		X	≤5	2pcs /side
		Y	≤3	
		Z	≤t	
Crack				Not acceptable

2. Testing Regulation

2-1. Testing Regulation

§ If the regulation is not specified, the test is performed under the supplier's regulation.

§ Tests are performed under the room temperature unless specified. The room temperature is referred as follows:

Temperature: 20°C±5°C
Humidity: 65%±10%RH

2-2. Environmental Specifications

§ Chemical Resistance Test

Condition: Tested after leaving the chemical on the surface for 12 hours being wiped off by cloth.

Judgement: Must be no effect in appearance.

2-3. Mechanical Characteristics

§ Activation Force Test

Condition: Measured by depressing the point between the dots to the conduction by the testing rod (Figure 1).

Judgement: Must satisfy the specification.

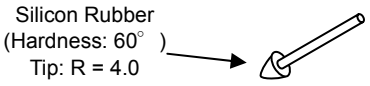


Figure 1. Testing rod 1

§ Operating Life Test (Finger)

Condition: Testing rod: Refer to Figure 1
Voltage: DC5V
Load: 3N
Cycle: 2 hits/sec

Judgement: Must satisfy the following:

Activation Force:	Must satisfy the specification.
Linearity:	Must satisfy the specification.
Terminal Resistance:	Must satisfy the specification.
Insulation Resistance:	Must satisfy the specification.

§ Operating Life Test (Pen)

Condition: Testing rod: Refer to Figure 2
Voltage: DC5V
Load: 2.5N
Input size: 10 x 10 mm
Input character: A to Z/minute

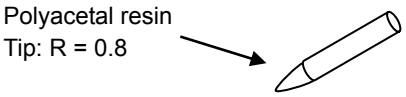


Figure 2. Testing rod 2

Judgement: Must satisfy the following:

Activation Force:	Must satisfy the specification.
Linearity:	Must satisfy the specification.
Terminal Resistance:	Must satisfy the specification.
Insulation Resistance:	Must satisfy the specification.

2-4. Electrical Characteristics

§ Terminal Resistance Test

Condition: Top and bottom electrodes are measured at the terminal.

Judgement: Must satisfy the specification.

§ Insulation Resistance Test

Neighboring Terminals: Measured by applying the reference voltage to the terminals

Active Area Electrodes: Measured by applying the reference voltage to the top and bottom electrodes.

Judgement: Must satisfy the specification.

2-5. Appearance

§ Appearance Test

Condition: Tested by an examiner with over 1.0 eyesight at 30cm away from the product under the transmittable light at over 60° the surface of the product.

Judgement: Must satisfy the specification.

3. Reliability Condition

3-1. Temperature Condition

§ Temperature Condition Test

Following test are performed in the condition with no dew condensation:

Cold Test: Tested after leaving the parts in -40°C±3°C for 240 hours and in the room temperature for 2 hours.

Heat Test: Tested after leaving the parts in 80°C±3°C for 240 hours and in the room temperature for 2 hours.

Humidity Test: Tested after leaving the parts in the temperature 60°C±3°C, humidity 90 to 95% for 240 hours and in the room temperature for 2 hours.

Cycle Test: Tested after 5 cycles of leaving the parts in the temperature -30°C±3°C for 1 hour and in the room temperature for 0.5 hours, then leaving the parts in the temperature 70°C±3°C for 1 hour and in the room temperature for 0.5 hours.

Judgement: Must satisfy the following:

Activation Force:	Must satisfy the specification.
Linearity:	Must satisfy the specification.
Terminal Resistance:	Must satisfy the specification.
Insulation Resistance:	Must satisfy the specification.
Appearance:	Must satisfy the specification.

4. Recommended Connector

4-1. Recommended Connector

Part No.	Pins	Pitch
KCA-K4R	4 pin Double-sided	1.25mm

5. Handling Notes

5-1. Precautions

§ This product is intended for use in standard applications (computers, office automation, and other office equipment, industrial, communications, and measurement equipment, personal and household devices, etc.) Please avoid using this product for special applications where failure or abnormal operation may directly affect human lives, or cause physical injury or property damage, or where extremely high levels of reliability are required (such as aerospace systems, vehicle operating control, atomic energy controls, medical devices for life support, etc.).

5-2. Handling Notes

§ Do not depress or scratch the product with any object with a sharp edge or end.

§ Do not forcibly bend or fold the product.

§ When the product is stored, make sure it is packed in a packing box and stored in a storage temperature range, eliminating any outside load.

§ Do not use or store the product under a condition where the product will be exposed to water, organic solution or acid.

§ Do not use the product under the direct sunlight.

§ Do not disassemble the product.

§ When you handle the product, Hold the product by its body. Do not hold by the tail.

§ Clean the product with a soft cloth or a soft cloth with neutral detergent or alcohol. When contaminated by chemicals, wipe them off immediately with caution not to cause injury to human body.

§ The edge of the glass is not rounded and may cause injury.

5-3. Construction Notes

§ The environmental specifications, mechanical characteristics, and electrical characteristics are only applied to the Active Area.

§ Do not use the touchscreen when the condensation occurs. The condensation inside of the touchscreen is a natural phenomenon and should disappear after the touchscreen is warmed up.

5-4. Electrical & Software Notice

The best performance can be obtained when used with the original analog resistive touchscreen controller, “TSC-10” Series. If the touchscreen controller or controller software is to be developed by the customer, please note the following:

§ There is a contact resistance between the top and bottom electrodes and it changes by the pressure of a finger or a pen. The data must be read after the contact resistance becomes stabilized.

§ The terminal resistance of the analog resistive touchscreen varies by the individual, time, and environment. The controller software must have the calibration function to adjust the input position and the display position.

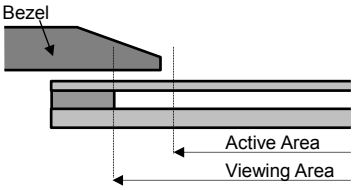
§ The analog resistive touchscreen outputs 2 point input as 1 point in between the 2 points. The controller software must not be designed to have the 2 point input function.

§ For drawing applications, the line may be intermittent when the pen comes on the dot spacers. A software compensation is needed.

5-5. Mounting Notes

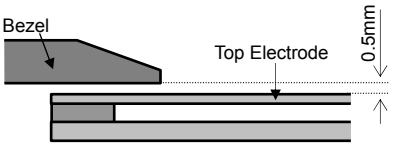
§ Bezel Edge

Bezel edge must be positioned in the area between the Active Area and the Viewing Area. The bezel may press the touchscreen and cause input if the edge enters the Active Area.



§ Gap between the Bezel and Touchscreen

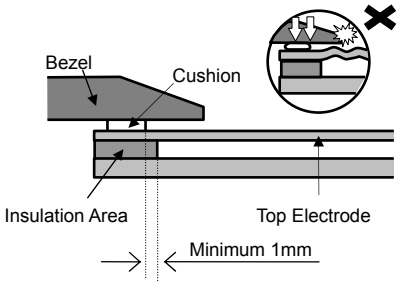
A gap of approximately 0.5mm is needed between the bezel and the top electrode. It may cause unexpected input if the gap is too narrow.



§ Cushion

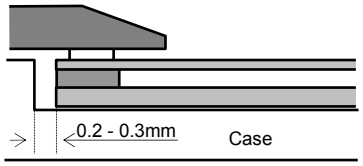
If a cushion is used between the bezel and the top electrode, the cushion must be free enough to absorb the expansion and contraction difference between the bezel and the top electrode. If the cushion is squashed too hard, the expansion and the contraction difference may cause the distortion to the top electrode.

The cushion must be positioned more than 1mm outward from an inside of the insulation area. (Please refer to right figure)



§ Tolerance

There is a tolerance of 0.2 to 0.3mm for the dimensions of the touchscreen and the tail. A gap must be made to absorb the tolerance in the case and the connector.

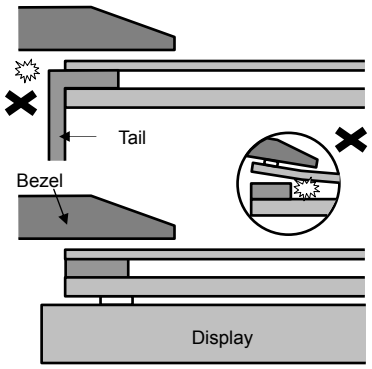


§ Tail

The tail must not be forcibly stressed or bent too hard to avoid the conduction in the insulated area and wire breaking.

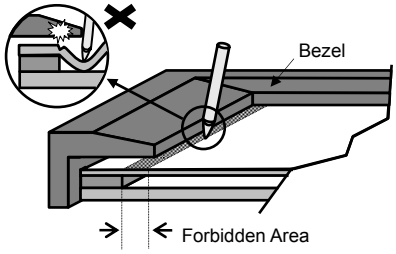
§ Mounting

Touchscreen must be held from the bottom such as the structure gluing the touchscreen onto the display. If the touchscreen is glued to the bezel, the adhesion between the top and bottom electrode is stressed and may come off.



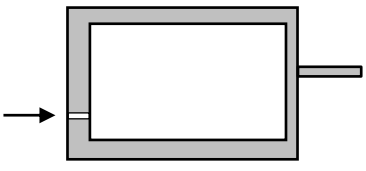
§ Forbidden Area

The area within 2mm from the insulation area is structurally week for the pressure, espcially for pen use. The film may be forcibly bent and may cause defection. This area must be protected by the bezel and input must be avoided.



§ Air Vent

Most of the touchscreens have the air vent to equalize the inside air pressure to the outside one. The air vent must be open and liquid contact must be avoided as the liquid may be absorbed if the lquid is accumilated near the air vent. The top electlode must not be swelled by the air pressure from inside of the case.



6. Warranty

6-1. Warranty Period

§ The warranty period is limited to 1 year from the date of shipping. The warranty for the initial defection such as appearance defection is limited to 1 month.

§ Any defected parts under proper use will be examined by the supplier and replaced by the new parts if the defection is considered to be caused by the supplier.

§ The replacement is subject to be included in the next lot.

6-2. Warranty Target

§ The warranty only covers the product itself and does not cover any damage to others caused by using this product. Onsite repair or replacement is not supported.

§ We will do our best for delivery problem and product defections, but the warranty for the production line is not covered.

§ Resistive touchscreens are structurally not repairable. All defections are subject to replacement.

6-3. Warranty Exceptions

Following conditions are not covered with the warranty and subject to charge.

§ Any malfunctions and damages during transportation and transfer by the user.

§ Any malfunctions and damages caused by a natural disaster or a fire.

§ Any malfunctions and damages caused by static electricity

§ Any malfunctions and damages caused by the failure of the associated equipment.

§ If the product is remodeled, disassembled or repaired by the user.

§ If the product is glued onto the equipment and uninstalled.

§ Any malfunctions and damages caused by an improper usage and handling against the specifications and notes.

6-4. Tools

§ To maintain the quality, the printing screens and the die-cut plates are generally limited to use up to 1 year. Reorders after 1 year from the initial order or from the last renewal are subject to the tooling charge for replacing the printing screens and the die-cut plates. Reorders for the discontinued standard parts are also subject to tooling charge.

§ All the tools, such as CAD data (except for the drawing for approval), block copies (films), printing screens, and die-cut plates are not to be provided for administrative purpose.

6-5. Changes

§ Because of the manufacturing process, changing the dimensions, circuit pattern, and the tail position requires replacing most of the tools and is subject to high tooling charge. Please be careful when ordering and approving the drawing.

§ Circuit pattern and the materials that does not affect the environmental, electrical, and mechanical characteristics such as film, glass, ink and glue are subject to change for the supplier’s reason or for improvement within the specifications.

§ Standard products are subject to change for improvement without notice.

7. Revision history

Rev1 (April 15, 1998)

Initial release

Rev2 (June 1, 1999)

The overall revision by specification review.

Rev3 (April 1, 2002)

The address in the office was changed by the move.

Rev4 (August 16, 2002)

1-4.Activation Force is changed “50g± 30g” to “0.5N±0.3”.

1-4.Light Transmission is changed 76% to 80%(TYP).

Rev5 (September 3, 2002)

1-3.Operating Temperature is changed “0°C to 60°C” to “-20°C to 70°C”.

1-3.Storing Temperature is changed “-20°C to 70°C” to “-40°C to 80°C”

1-4.Operating Life is changed “1,000,000 hits” to “10,000,000 hits”.

1-5.Linearity is changed “Under ±2%” to “Under ±1% (typical value)”.

Rev6 (June 28, 2004)

1-3.Operating Humidity is changed “Less than 90%RH (no condensation)” to “-20°C to 60°C Less than 90%RH (no condensation) Exceeding 60°C 133.8g/m^3 (no condensation)”.

1-3.Storing Humidity is changed “Less than 95%RH (no condensation)” to “-40°C to 60°C Less than 95%RH (no condensation), Exceeding 60°C 142.9g/m^3 (no condensation)”.

1-5.Maximum Voltage is changed “DC5V” to “DC6V”.

1-5.Linearity is changed “Under ±1% (typical value)” to “Under ±2% (Under ±1% (typical value))”.

Rev7 (October 15, 2004)

4-4.Electrical & Software Notice: Changed “FIT-10 series” to “TSC-10 series”.

Rev8 (April 7, 2005)

Added Item4 Recommended Connector.

Rev9 (September 6, 2005)

2-3.Mechanical Characteristics: Added Operating Life Test (Pen).

Rev10 (November 10, 2006)

The specification item name was changed.

1-3.”Storing Temperature” to “Storage Temperature”

1-3.”Storing Humidity” to “Storage Humidity”

1-4.”Operating Load” to “Activation Force”

1-4.”Light Transmissivity” to “Light Transmittance”

1-4.”Top Surface Hardness” to “Surface Hardness”

2-3.”Operating Load Test” to “Activation Force Test”

2-3.”Operating Load” to “Activation Force”

3-1.”Operationg Load” to “Activation Force”

1-4.Operating Force is changed “0.5N±0.3N” to “0.05N to 0.8N”.

1-5.Insulation Resistance is changed “Over 100MΩ at 25V” to “Over 20MΩ at 25V”.

1-6.Tip, crack: Deleted “Applied only in the Active Area. Scratches or dusts in the outside of the Active Area are acceptable unless the electrical characteristics are affected.”.

2-3. § Operating Life Test (Pen) Load: 300g to 250g

5-5. § Cushion: Added an installation position of a cushion.

7.Added Revision History.

Rev11 (March 23, 2010)

1-6. Appearance specification was revised. Characters of scratch/dust were classified into Circular and Linear. The total acceptable number of scratch/dust was added.

2-3. Unit of Load (g) changed to (N) to unify the unit

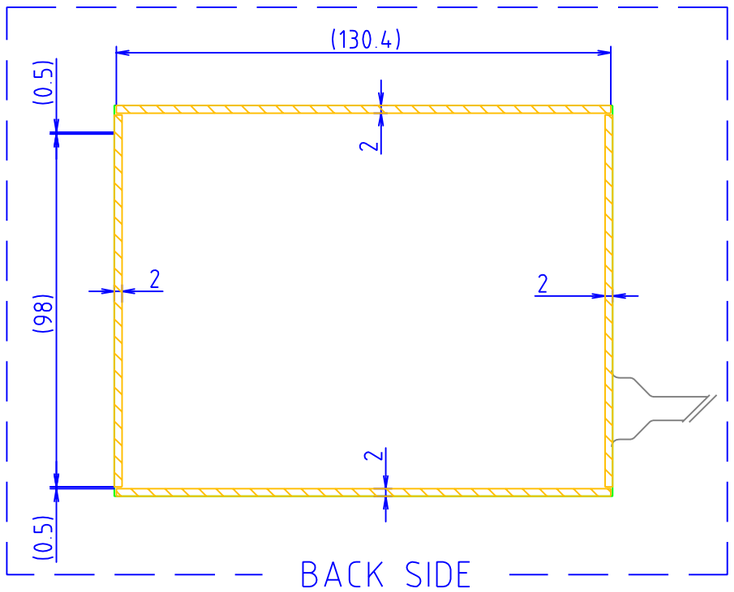
2-3. Operating Life Test (Finger) Activation Force, Within ±50% of the specification → Must satisfy the specification. (Clerical error was corrected)

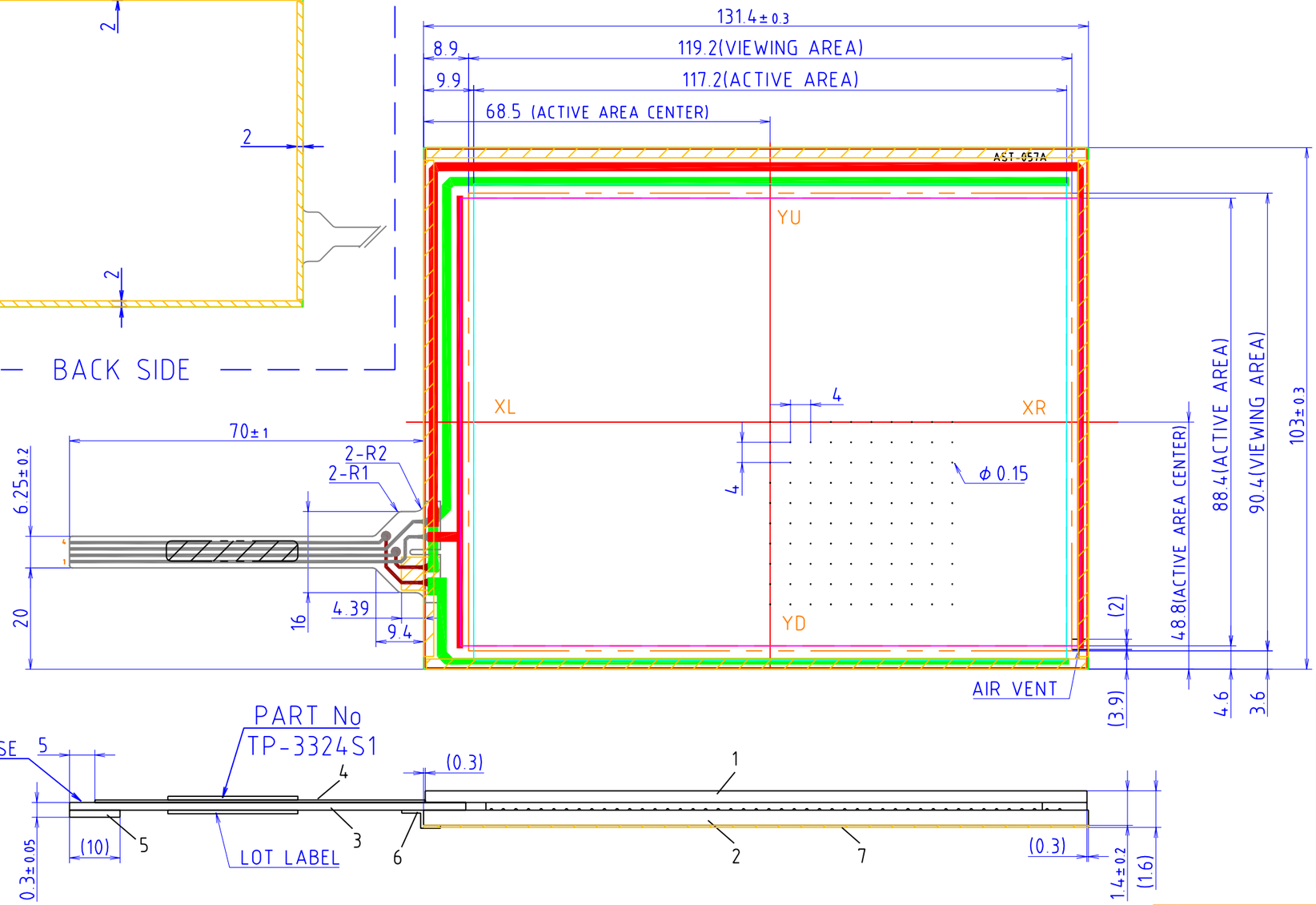
2-3. Operating Life Test (Pen) Activation Force, Within ±50% of the specification → Must satisfy the specification. (Clerical error was corrected)

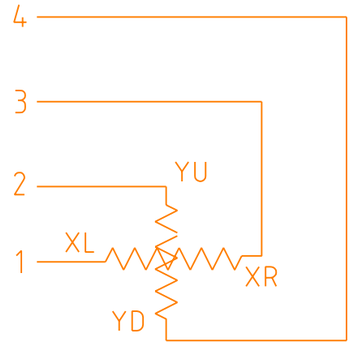
3-1. Temperature Condition Cold Test -30℃→ -40℃ (Clerical error was corrected)

3-1. Activation Force, Within ±50% of the specification. → Must satisfy the specification
(Clerical error was corrected)

DATA MODUL







PIN ASSIGNMENT

REMARKS		
TAIL PATTERN PITCH		1.25mm
TAIL PATTERN WIDTH	Ag	0.8mm
	-	– mm
CIRCUIT PATTERN WIDTH	Ag	1.5~2.0mm
	-	– mm
○RED: TOP CIRCUIT, GREEN: BOTTOM CIRCUIT.		
○PURPLE: TOP CIRCUIT, LIGHT BLUE: BOTTOM CIRCUIT.		
○0.15φ DOT SPACER ON BOTTOM SHEET.		
○TOLERANCE=0.5mm EXCEPT WHERE INDICATED.		

	ITEM	MATERIAL	REMARKS
1	ITO FILM	POLYESTER 188μm	ANTI-GLARE
2	ITO GLASS	t =1.1mm	
3	TAIL	POLYESTER 38μm	
4	REINFORCEMENT FILM	POLYESTER 25μm	
5	STIFFENER	POLYESTER 250μm	
6	PROTECTION TAPE	POLYESTER 25μm	
7	ADHESIVE SHEET	ACRYLIC 160μm	

Unit: mm

CUSTOMER APPROVAL
DATE: / /

			PART No.	APPROVED	CHECKED	CHECKED	TRACED	DESIGNED
			TP-3324S1F0	Dec/16/04		Dec/16/04	Dec/13/04	MOUE
				NEMOTO		HIRATA	MOUE	
			TYPE					
Dec/13/04	FIRST EDITION	MOUE	Data Modul Ag	DMC Co., Ltd.				
DATE	REVISION	NAME	CIRCUIT DRAWING					

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